



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/757,645

01/13/2004

Jeffrey R. Dahn

58582US003

3942

32692

7590

05/23/2008

3M INNOVATIVE PROPERTIES COMPANY

PO BOX 33427

ST. PAUL, MN 55133-3427

EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

05/23/2008

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LegalUSDocketing@mmm.com

LegalDocketing@mmm.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/757,645	<b>Applicant(s)</b> DAHN ET AL.	
	<b>Examiner</b> TRACY DOVE	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7,9,10 and 15-22 is/are pending in the application.
- 4a) Of the above claim(s) 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7,9,10,15,21 and 22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 2/28/08. Applicant's arguments have been considered, but are not persuasive. Claims 1-7, 9, 10 and 15-22 are pending. Claims 16-20 are withdrawn.

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/28/08 has been entered.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-7, 9, 10 and 15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recites a range of " $0.025 \leq x \leq 0.35$ ", which is not supported by the specification as filed. The specification does not support an end point of less than or equal to 0.35 for x. Applicant states support is found in Figure 1 of the specification, however, proper

Art Unit: 1795

support has not been found by the Examiner for the specific endpoint. The specification does not enable one of skill in the art to pick the specific upper endpoint of the claimed range for x.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-7, 9, 10 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "boron compound(s)". There is insufficient antecedent basis for this limitation in the claim. The claim should clearly recite if at least one boron compound or at least two boron compounds are required. The "a" (a boron compound) means at least one, but the "(s)" (boron compound(s)) indicates at least two.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1795

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-7, 9, 10 and 15 are rejected under 35 U.S.C. 102(b)/103(a) as being anticipated by, and alternatively unpatentable over, Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula  $\text{Li}_x\text{Mn}_a\text{Ni}_b\text{Co}_c\text{O}_2$  with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of  $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$ , among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027). The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Thus the claims are anticipated. The pellet density of claim 1 and the properties recited by claim 9 and 10 of the produced Li-Ni-Co-Mn-oxide compound are considered inherent in view of the teachings of Shiozaki. Since the method of the claimed invention and the method of the prior art appear to be the same, one of skill would have known that the similar materials produced by the similar methods would have similar properties.

\*

Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over, Kang et al., US 7,205,072 B2.

Art Unit: 1795

Kang teaches a cathode material for a lithium ion rechargeable battery. The cathode material has the formula  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  wherein x is between 0 and 0.3,  $\alpha$  is between about 0.2 and 0.6,  $\beta$  is between about 0.2 and 0.6,  $\gamma$  is between about 0 and 0.3,  $\delta$  is between about 0 and 0.15, and z is between about 0 and 0.2 (abstract). To prepare the  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  compound, appropriate amounts of lithium hydroxide (or lithium carbonate), lithium fluoride and Ni-Mn-Co-hydroxide are mixed. The mixture is calcined at 450-550°C for 12-30 hours in air and then at 900-1000°C for 10-24 hours in either air or oxygen containing atmosphere (3:17-24). Claims 21 and 22 recite properties of the produced Li-Ni-Co-Mn-oxide compound, which are considered inherent in view of the teachings of Kang.

Kang does not explicitly state the amount of sintering agent added to the mixture to prepare the cathode active material compound.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Kang teaches an appropriate amount of lithium fluoride may be added to the mixture depending on the desired compound oxide to be produced. Furthermore, Figure 4 teaches and suggest varying the amount of LiF in the mixture to produce various compound oxide cathode active materials. Figure 4 at least suggest 2% of LiF was added to the mixture. Furthermore, the courts have ruled where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. In re Swain et al., 33 CCPA 1250, 156 F.2d 239, 70 USPQ 412. The courts have held that a limitation merely with respect to proportions in a composition of matter or process will not support patentability unless such limitation is “critical”. Minerals Separation, Ltd. v. Hyde, 242 U.S. 261 (1916). Furthermore, the courts have ruled that

Art Unit: 1795

discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977).

Since the method of the claimed invention and the method of Kang appear to be the same, one of skill would have known that the similar materials produced by the similar methods would have similar properties.

\*

Claims 4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiozaki et al, JP 2002-304993.

Shiozaki teaches a positive electrode active material for a secondary battery having the formula  $\text{Li}_x\text{Mn}_a\text{Ni}_b\text{Co}_c\text{O}_2$  with a, b and c represented by the Figure shown with the abstract. Table 1 teaches a specific compound of  $\text{LiMn}_{0.35}\text{Ni}_{0.42}\text{Co}_{0.23}\text{O}_2$ , among other specific compounds. The positive electrode active material may be used in a lithium ion battery (0019). A transition mixed metal hydroxide may be used as a raw material or a precursor (0021). A boron compound is added to the mixture before heat treatment to effect sintering. The boron compound may be boric acid or boron oxide in an amount of 0.001 to 0.1 times to amount or (a+b+c) (0025). A lithium compound such as lithium hydroxide or lithium carbonate is added to the mixture (0026). The mixture is heat treated at a temperature between 950-1100°C (0027). The mixture is heat treated in oxygen atmosphere for 5 hours (0069-0080).

Shiozaki does not explicitly teach the mixture is heated for at least about 6 hours. However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because heat treating for at least 6 hours is considered

Art Unit: 1795

obvious in view of the teaching by Shiozaki to heat treat for 5 hours. Note claims 9 and 10 are considered inherent in view of the teachings of Shiozaki.

### ***Response to Arguments***

Applicant's arguments filed 2/28/08 have been fully considered but they are not persuasive.

Regarding Shiozaki, Applicant asserts the Examiner has not met the initial burden necessary to support an inherency rejection. Examiner disagrees. Since the method of the claimed invention and the method of Shiozaki appear to be the same, one of skill would have known that the similar materials produced by the similar methods would have similar properties. Applicant has not shown how the claimed compound and the compound of Shiozaki, which are made by the same method, would have different pellet densities (properties).

Applicant argues column 1, lines 51-55 of Kang make it clear that the purpose of Kang is fluorine doping of Ni-Mn-Co-oxide compounds to improve electrochemical cycling performances. However, Kang is not limited to the cited section. Kang teaches a cathode material for a lithium ion rechargeable battery. The cathode material has the formula  $\text{Li}_{1+x}\text{Ni}_\alpha\text{Mn}_\beta\text{Co}_\gamma\text{M}'_\delta\text{O}_{2-z}\text{F}_z$  wherein x is between 0 and 0.3,  $\alpha$  is between about 0.2 and 0.6,  $\beta$  is between about 0.2 and 0.6,  $\gamma$  is between about 0 and 0.3,  $\delta$  is between about 0 and 0.15, and z is between about 0 and 0.2 (abstract). Furthermore, the teachings of Kang are not limited to the claims alone and subject matter surrendered during prosecution is still considered "disclosed" subject matter for prior art purposes.



All rejections found in the previous office action, but not in the present office action have been withdrawn because Applicant provided persuasive arguments and/or amendments to overcome those rejections.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Tracy Dove/  
Primary Examiner, Art Unit 1795

May 20, 2008